RECORDS MANAGEMENT APPLICATION PILOT PROJECT:
BASELINE SURVEY

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INTRODUCTION

Networked computers have been widely adopted by the public sector, and their use is expected to grow as new digital government initiatives emerge. While the transition to electronic government is expected to enable public sector organizations to improve the quality and efficiency of their services, it also gives rise to serious records management concerns.

Most organizations' file management and record keeping methods were developed for paper-based record material and are being rendered obsolete or ineffective by computers. New records management application (RMA) software, however, promises to improve the transparency and accountability of official interactions that rely on electronic records.

For this reason, the Records and Forms Management Division in Michigan's Department of Management and Budget (DMB) is taking the lead in introducing and evaluating RMA software (ForeMost) on a trial basis among employees in DMB's Office of Support Services (OSS). Lessons learned from this pilot project are expected to inform and guide the development of electronic records management procedures more broadly in DMB, as well as other Michigan state agencies.

The report that follows provides baseline quantitative data from a survey sent to all prospective participants in the pilot trial of RMA software prior to its implementation. It is intended to establish a systematic account of information- and communication-based work practices and current techniques for supporting them with electronic tools. A similar survey data gathering effort will be carried out after RMA software is installed, in order to learn whether and how the management of these electronic resources has changed. The results should also help clarify the conditions under which findings from the RMA pilot project will extend to other units in DMB or to other Departments.

A companion report provides more detailed qualitative data gathered from a subset of 12 pilot project participants. Results of the qualitative study will complement findings from this quantitative evaluation.

QUANTITATIVE EVALUATION APPROACH

The baseline survey sought to obtain standardized data about a wide variety of current organizational context characteristics, task activities, and information-handling practices. Items were selected for inclusion in the questionnaire on the basis of their potential relevance to the need for RMA software or for the light they could shed on implementation boosters or barriers. Where possible, these items were adapted from surveys used in prior information technology evaluation research.

Although the baseline responses to the survey may be of some interest in themselves, it is comparisons between pre- and post-implementation responses that will yield the main findings of significance for pilot project evaluation purposes.

Participants

The participant pool for the survey comprised 63 employees expected to take part in the pilot trial of the RMA software. These employees belong to six Divisions: OSS Administration/Business Services, Records and Forms Management, Mail and Delivery/Materials Management Services, Print and Graphics Services, and the Consolidated Print Center. They represent four different job types, including managers, analysts, administrative support staff and labor/tradespersons.

Procedures

Questionnaires contained a series of close-ended items that required 20 minutes or less to complete. They were mailed by the pilot project team to respondents and returned, without identifying information, for data entry. Data analyses were carried out by external consultants to the pilot project team using a standard statistical software package (SPSS). Findings from these analyses are presented below in an order that parallels the order of the questionnaire itself.

The first two items of the questionnaire asked respondents to indicate their job type and divisional affiliation (see above). Responses to these questions are used as grouping variables in subsequent analyses of variance to learn whether, for instance, information handling practices or computer experience differ as a function of job type or division (for analysis purposes, administrative support staff and labor/tradesperson categories had to be combined, yielding a 3-level job-type grouping variable including managers, analysts and others).

After soliciting some background details, the questionnaire asked respondents to indicate how often, in a typical work week, they carry out a number of information-based tasks (e.g., write memos, fill out forms, use a spreadsheet or database). These data were factor analyzed, yielding four major dimensions or profiles of information work. Such empirically derived dimensions--reflecting document work, administrative support, data work, and information retrieval--provide a third major lens for examining subsequent survey responses. Independently of job type or

division membership, factor analysis results can be used to determine, for example, whether information handling practices or computer experience are associated with the extent to which work is data-oriented vs. document-oriented.

Findings are reported as frequencies, percentages, means and standard deviations, or correlations, as appropriate. Where analyses yield results that are statistically significant (with a .05 confidence level), this is indicated in the text; significant correlation values are also marked with asterisks.

FINDINGS

Description of Respondents

There were 48 responses to the quantitative survey, representing a 76 percent response rate. Table 1 shows the distribution by job type. Managers made up over half the sample, with roughly equal numbers of analysts and other personnel making up the remainder.

Table 1

		Frequency	Percent
	analyst	12	25.00
	management	25	52.08
	other	10	20.83
	Total	47	97.92
Missing		1	2.08
Total		48	100

Table 2 shows the distribution by division. Five units were represented. [1]

Table 2

	Frequency	Percent
Admin and Business Services	7	14.58
Print Center	5	10.42
Mail Delivery	15	31.25
Print and Graphics	8	16.67
Records and Forms Management	12	25.00
Total	47	97.92
Missing	1	2.08
Total	48	100

On average, respondents had been in their jobs quite a long time, averaging 20.5 years with the State (SD = 9.6, median = 24) and 14.3 years in their current job (SD = 11.3, median = 12). As Table 3 shows, analysts tend to have been with the State nearly as long as the other groups, but in their current job for notably shorter periods.

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[1] Tables 1 and 2 show the frequency counts for job type and division. In subsequent tables, the frequencies have been omitted as redundant; the frequencies given here may be used to help interpret them, as needed (see also the Appendix).

Table 3

		With State	In Current Job
analyst	Mean	17.92	7.92
	Std. Deviation	12.35	11.64
management	Mean	22.80	17.56
	Std. Deviation	7.84	10.99
other	Mean	18.20	15.40
	Std. Deviation	10.23	10.10
Total	Mean	20.57	14.64
	Std. Deviation	9.74	11.48

Table 4 shows the distribution of tenure by division. There was little difference in tenure with the state across divisions; however, those in the Print Center tended to have been in their current jobs a very short time because of the recency of the Center's creation.

Table 4

		With State	In Current Job
Admin and Business Services	Mean	20.86	9.71
	Std. Deviation	6.62	10.97
Print Center	Mean	20.60	1.60
	Std. Deviation	8.41	0.55
Mail Delivery	Mean	24.00	19.73
	Std. Deviation	5.72	8.05
Print and Graphics	Mean	21.63	21.63
	Std. Deviation	8.78	8.78
Records and Forms Management	Mean	14.92	11.83
	Std. Deviation	14.16	13.58
Total	Mean	20.45	14.62
	Std. Deviation	9.69	11.51

Years of computer experience ranged from 0 to 28, averaging 10.5 (SD = 6.2, median = 9). As Table 5 shows, analysts averaged nearly 5 years more computer experience than managers, and nearly 10 years more than other personnel.

Table 5

		Computer Experience
analyst	Mean	14.42
	Std. Deviation	6.53
management	Mean	9.78
	Std. Deviation	4.57
other	Mean	4.57
	Std. Deviation	4.24
Total	Mean	10.24
	Std. Deviation	6.00

Table 6 shows the distribution of computer experience by division. Those in Print and Graphics and Mail Delivery tended to have less computer experience than those in the other divisions.

Table 6

		Computer Experience
Admin and Business Services	Mean	16.4
	Std. Deviation	7
Print Center	Mean	13.40
	Std. Deviation	7
Mail Delivery	Mean	6.62
	Std. Deviation	4
Print and Graphics	Mean	9.00
	Std. Deviation	3
Records and Forms Management	Mean	11.67
	Std. Deviation	6
Total	Mean	10.43
	Std. Deviation	6

Respondents were also asked to estimate their current knowledge of computer applications on a scale of 1 to 5. The average response was 3.48, or about halfway between "intermediate" and "complete" knowledge (SD = 1.28). There were no particular differences in knowledge across divisions. With respect to job types, analysts reported a slightly higher level of knowledge than did the other groups, but the differences were not statistically significant. There was a

significant correlation (r = .50*) between years of reported computer use and degree of reported knowledge of applications. [2]

Information Work

Respondents were asked about the frequency with which they engaged in each of 17 different kinds of information work. Table 7 shows these items and their average frequency, in decreasing order. Document work is the most common kind of information work, with graphics and programming the least frequent.

Table 7

	Mean	Std. Dev.
use documents	3.27	1.30
create documents	3.25	1.34
activity logs	3.21	1.34
write memos	3.19	1.35
supervise info work	3.15	1.56
use databases	3.15	1.35
retrieve information	3.08	1.33
fill out forms	3.04	1.06
analyze data	2.98	1.55
create databases	2.85	1.44
edit	2.63	1.41
assemble information	2.57	1.25
write reports	2.57	1.35
admin support	2.54	1.57
develop forms	2.17	1.21
use graphs	2.17	1.19
programming or statistics	2.02	0.99

A principal components factor analysis of the information work items (with oblique rotation) yielded a four-factor solution accounting for 71% of the variance in the original 17 items. These factors appear to express four dimensions:

- Document work (write reports, edit, create documents, etc.)
- Administrative support (develop forms, administrative support, activity logs, etc.)
- Data work (create databases, use graphs, programming, etc.)
- Information retrieval (assemble information, use documents, retrieve information, etc.)

These factors are intercorrelated in varying degrees (Table 8).

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[2] Here and in tables below showing Pearson correlation coefficients and where such coefficients are referenced in the text, statistically significant coefficients (p < .05) are indicated by asterisks (*).

Table 8

	Document work	Administrative support	Data work
Administrative support	.27		
Data work	.35*	.22	
Information retrieval	.33*	.28	.15

There are no significant differences among the kinds of information work done in the different divisions. Among job types, analysts tend to do significantly more "data work" than do the other groups, but there are no other major differences.

Group-Based Tasks

Respondents were asked to estimate the proportion of their work that was group-based (dependent on cooperation/communication). On a scale of 1 to 5 (very low to very high), the average was 3.68 (SD = 1.34), or moderately high.[3] There were essentially no differences across job types. The differences were a little larger across divisions, but the differences were not statistically significant (Table 9).

Table 9

	Mean	Std. Dev.
Admin and Business Services	4.14	0.69
Print Center	4.40	0.55
Mail Delivery	3.40	1.35
Print and Graphics	4.25	1.04
Records and Forms Management	3.08	1.73
Total	3.68	1.34

Respondents were also asked to indicate the proportion of their work that involved others, in four categories:

- Other staff from the division
- Others in DMB but not the division
- Others from other state departments
- Others from outside state government

In addition, an index of total external involvement in work was calculated by summing the frequency of external contact across all four categories.

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[3] In the material that follows, we generally report means of variables scored on 1-5 scales, as the most useful basis for comparison. The Appendix shows the actual frequency counts for each of the categories of all the scalar variables.

Table 10 shows the occurrence of external contact by job type. While there are some marginal differences in external contact, none of these differences are all that large, and are not statistically significant.

Table 10

		only my division	others in DMB	other depts	outside state gov	total external contact
analyst	Mean	2.92	2.09	2.83	1.42	9.08
	Std. Deviation	1.62	1.58	1.80	1.00	4.70
management	Mean	2.76	2.04	2.24	1.17	8.00
	Std. Deviation	1.20	1.19	1.27	0.38	2.84
other	Mean	3.10	2.11	2.60	1.30	8.90
	Std. Deviation	1.52	1.45	1.43	0.95	4.09
Total	Mean	2.87	2.07	2.47	1.26	8.47
	Std. Deviation	1.36	1.32	1.44	0.71	3.61

Table 11 shows the breakdown in external contact by division. Again, none of the differences are particularly large or significant.

Table 11

		only my division	others in DMB	other depts	outside state gov	total external contact
Admin and Business Services	Mean	3.00	2.43	2.14	1.43	9.00
	Std. Deviation	1.15	0.98	1.07	1.13	2.65
Print Center	Mean	2.40	2.00	2.40	1.60	8.40
	Std. Deviation	1.14	1.22	1.52	0.89	4.34
Mail Delivery	Mean	2.67	1.92	2.20	1.14	7.60
	Std. Deviation	1.23	1.26	1.32	0.36	2.77
Print and Graphics	Mean	3.63	3.00	3.13	1.38	10.75
	Std. Deviation	1.51	1.63	1.81	1.06	5.18
Records and Forms Management	Mean	2.75	1.36	2.50	1.00	7.50
	Std. Deviation	1.60	1.21	1.62	0.00	3.48
Total	Mean	2.87	2.05	2.45	1.24	8.40
	Std. Deviation	1.36	1.33	1.46	0.71	3.65

There are no particular relationships between amount of external contact and the information work scores; each type of work tends to have a moderate amount of external contact (r coefficients between .20 and .40), but there are no significant patterns of differences.

Experiences with Information Technology

Respondents were asked to assess how computer use affected both their personal work effectiveness and the quality of their working life. In general, they judged both effects to be positive; on a 5-point scale, the average for work effectiveness was 4.3 (SD = .92), and the average for work life quality was 4.2 (SD = .96). The two measures are highly correlated (r = .86*).

As Table 12 shows, there were no meaningful differences in these scores by job type.

Table 12

		computer use influence on work effectiveness	computer use influence on work life quality
analyst	Mean	4.33	4.25
	Std. Deviation	0.78	0.97
management	Mean	4.38	4.16
	Std. Deviation	0.77	0.80
other	Mean	4.10	4.10
	Std. Deviation	1.37	1.37
Total	Mean	4.30	4.17
	Std. Deviation	0.92	0.96

Table 13 shows the distribution of these scores by division. Again, there were no significant differences among the divisions, although the Mail delivery unit did tend to be somewhat below the others in satisfaction with computer use.

Table 13

		computer use influence on work effectiveness	computer use influence on work life quality
Admin and Business Services	Mean	4.57	4.43
	Std. Deviation	0.79	0.98
Print Center	Mean	4.40	4.40
	Std. Deviation	0.55	0.55
Mail Delivery	Mean	3.71	3.67
	Std. Deviation	1.20	1.05
Print and Graphics	Mean	4.75	4.50
	Std. Deviation	0.46	0.76
Records and Forms Management	Mean	4.50	4.33
	Std. Deviation	0.67	0.98
Total	Mean	4.30	4.17
	Std. Deviation	0.92	0.96

Respondents were also asked their opinions about the degree of top management support for information system improvements, and about the degree of user involvement in such improvements. Respondents generally felt that top management was supportive (mean = 3.94, SD = 1.03), but felt themselves only moderately involved (mean = 3.04, SD = 1.28). As Table 14 shows, managers saw less top level support and felt themselves somewhat less involved than did the other two groups.

Table 14

		top management support	user involvement
analyst	Mean	4.08	3.17
	Std. Deviation	0.90	1.34
management	Mean	3.88	2.88
	Std. Deviation	0.97	1.30
other	Mean	3.90	3.30
	Std. Deviation	1.37	1.25
Total	Mean	3.94	3.04
	Std. Deviation	1.03	1.28

Table 15 shows these values by division. The Print Center, Mail Delivery, and Records Management personnel generally felt themselves somewhat less involved in information system improvement processes, while Administrative Services personnel tended to feel themselves more involved.

Table 15

		top management support	user involve-ment
Admin and Business Services	Mean	4.43	4.14
	Std. Deviation	0.53	0.90
Print Center	Mean	3.60	3.00
	Std. Deviation	0.89	1.58
Mail Delivery	Mean	3.40	2.40
	Std. Deviation	1.24	1.18
Print and Graphics	Mean	4.13	3.38
	Std. Deviation	0.99	1.30
Records and Forms Management	Mean	4.33	2.92
	Std. Deviation	0.78	1.16
Total	Mean	3.94	3.02
	Std. Deviation	1.03	1.29

There are some interesting relationships between these experience variables and the kinds of information work people are performing. Table 16 shows the correlations between the experience items and the information work scores described above. Individuals performing larger quantities of document work tend to see the influence of the computer in more positive terms, while those doing administrative support and data work tend to have a less positive association.

Table 16

	computer use influence on work effectiveness	computer use influence on work life quality	top management support	user involve-ment
document work	.51*	.55*	.36*	.26
administrative support	.25	.26	-.02	.03
data work	.24	.27	.44*	.33*
information retrieval	.36*	.34*	.13	.17

Those doing administrative support and information retrieval tend to experience less management support and user involvement, while those doing document work see more of both.

Sources of Help and Learning

Respondents were asked to rank several sources of help with IT problems. Table 17 shows the distribution of first choices by job type. Overall, a co-worker was the most preferred source of help generally, selected as first choice by about two-thirds of respondents. No other source was chosen by more than a sixth of respondents.

Table 17

	analyst	management	other	Total
online help	5	1	2	8
ITSD help desk	0	1	1	2
co-worker	4	21	7	32
vendor	3	2	0	5
Total	12	25	10	47

Over half the analysts, however, preferred online help and vendors, while co-workers were vastly preferred by the other groups.

Respondents were also asked to rank preferred sources for learning about new applications. Table 18 shows the distribution of these sources of training by job type.

Table 18

	analyst	management	0ther	Total
classroom	3	7	2	12
small group	0	6	3	9
coaching	2	12	5	19
experimentation	7	0	0	7
Total	12	25	10	47

Again, it is worth noting that while overall preference is expressed for coaching and classroom training, analysts particularly enjoy experimentation.

Table 19 shows the interaction of training and help mode preferences.

Table 19

	classroom	small group	coaching	Experimen- tation	Total
online help	3	1	1	3	8
ITSD help desk	1	1	0	0	2
co-worker	6	7	18	1	32
vendor	2	0	0	3	5
Total	12	9	19	7	47

Those who like co-worker help also tend to like individual coaching and classroom training, while those who like other forms of help also prefer other forms of training.

Handling Electronic Information

Respondents were asked a number of questions about their handling of various kinds of electronic information. First, they were asked about saving email messages, both those that they sent and those that they received.[4] Table 20 shows the degree of email saving by job type. Analysts tended to save a higher proportion of the mail that they received; however, managers

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[4] These and other information management questions were asked in the form of ranges of percentages, such as "the proportion of email saved". The figures reported here are in terms of quintiles. Thus, a coefficient of 3.0 would be interpreted as falling into the third quintile, or a range from 45-65%. It seems more useful to report coefficients rather than the necessarily more broad-ranging percentage values. Percentages reported in studies like this are notoriously unstable, and quintiles typically provide much more effective information for analytical purposes.

tended to save a higher proportion of the mail that they sent to others. The differences, while interesting, are not statistically significant.

Table 20

		sent email saved	received email saved
analyst	Mean	2.08	2.58
	Std. Deviation	1.38	1.00
management	Mean	2.17	2.42
	Std. Deviation	1.27	1.47
other	Mean	1.90	1.80
	Std. Deviation	0.88	1.03
Total	Mean	2.09	2.33
	Std. Deviation	1.21	1.28

Table 21 shows email saving behavior by division. Not unsurprisingly, Administrative Services and Records Management personnel tend to save a significantly higher proportion of their email, both sent and received, than do personnel in the other units.

Table 21

		sent email saved	received email saved
Admin and Business Services	Mean	2.86	3.14
	Std. Deviation	1.07	1.07
Print Center	Mean	2.00	3.00
	Std. Deviation	1.22	1.00
Mail Delivery	Mean	1.86	1.64
	Std. Deviation	0.95	1.08
Print and Graphics	Mean	1.63	1.88
	Std. Deviation	0.74	0.83
Records and Forms Management	Mean	2.33	2.50
	Std. Deviation	1.61	1.38
Total	Mean	2.11	2.28
	Std. Deviation	1.20	1.22

There are again some interesting relationships between information work and email management. Table 22 shows the correlations of amounts of information work performed in various categories and email saving.

Table 22

	sent email saved	received email saved
document work	.27	.24
admin support	-.05	-.03
data work	.00	.21
information retrieval	.12	.04

Those performing a lot of document work tend to save their email at a higher rate than do those doing administrative work. Those doing data work tend to save their received email, but not their sent email, for reasons that are not wholly clear.

Respondents were also asked about their storage of electronic records. There were no particular relationships between storage behavior and job type. However, as Table 23 shows, storage behavior does differ across divisions.

Table 23

		records saved	records saved in e-form	records saved in print-form	records saved in both forms
Admin and Business Services	Mean	3.43	2.50	3.14	2.83
	Std. Deviation	1.72	1.76	1.68	1.17
Print Center	Mean	3.00	3.50	1.00	2.50
	Std. Deviation	1.87	1.73	0.00	1.73
Mail Delivery	Mean	2.00	2.36	2.00	1.18
	Std. Deviation	1.11	1.75	1.30	0.40
Print and Graphics	Mean	2.25	1.88	1.88	2.00
	Std. Deviation	1.16	0.83	1.13	1.00
Records and Forms Management	Mean	3.92	3.11	1.13	3.00
	Std. Deviation	1.31	1.83	0.35	1.76
Total	Mean	2.87	2.58	1.93	2.21
	Std. Deviation	1.53	1.62	1.31	1.40

As with email, Administrative Services and Records Management personnel tend to save a higher proportion of their electronic records than do the other units. It is also interesting that Mail and Administrative Services are the two units that save a high proportion of records in paper form, while the highest proportions of electronic storage are in the Print Center and Records Management.

As before, there are relationships between information work and records retention. Table 24 shows correlations between these behaviors.

Table 24

	records saved	records saved in e-form	records saved in print-form	records saved in both forms
document work	.40*	-.02	.07	.35*
admin support	-.07	-.07	.05	-.08
data work	.19	.15	-.16	.13
information retrieval	.20	-.10	.11	.09

Those doing document work tend to save a lot of their work, and to save it in both paper and electronic forms. Those doing administrative support tend not to save their work in either form. Those doing data work are more prone to save in electronic form but not in paper form.

Respondents were also asked about the ease of locating electronic documents that had been previously saved, using a 5-point scale (where higher numbers represent greater ease of finding). The average ease of locating newer documents was 3.78 (SD = 1.19); the average ease of locating older documents was 3.46 (SD = 1.33). There were no meaningful differences between job types or divisions in terms of location ease. However, there was an interesting interaction between ease of location and the information storage format (Table 25).

Table 25

	ease of locating new records	ease of locating old records
records saved in e-form	.16	.23
records saved in print-form	-.22	-.21
records saved in both forms	.20	.19

While there is a positive correlation between the ease of locating records and their availability in electronic form, there is an equally large negative correlation with the retention of records in

paper form only (these differences do not, however, reach statistical significance). It may be, thus, that electronic record keeping facilitates retrieval, although the small sample size makes it difficult to be sure.

Finally, respondents were asked about their patterns of review and deletion of older electronic records. Table 26 shows the frequency of different review strategies.

Table 26

	Percent
every 6 months	27.08
every year	2.08
when time is available	50.00
when disk is full	4.17
never	8.33
other	6.25

The most common response is "when time is available". There are no significant differences in retention/review behavior by division or job type.

Electronic Records Management Problems

Respondents were asked about a series of records management problems that might occur in the electronic context. Table 27 shows the average answers to these questions. Although each of these questions has a somewhat different response scale adapted to the particular issue, all the scales are 5-point versions where the high and low points reflect, respectively, very high and very low degrees of the dimension named. Thus, the general degree of performance on these dimensions can be approximately compared in a relative way (see also survey questions 20-25).

Overall, respondents were not likely to confuse electronic versions of documents (mean = 2.3 out of 5), and quite unlikely to lose such records (mean = 1.8). They were only sometime likely to need to obtain others' electronic records, or have other obtain theirs.

Table 27

	Mean	Std. Dev.
confuse e-records	2.27	1.10
lose e-records	1.80	.78
need to obtain others' e-records	2.49	1.40
ease of obtaining others' e-records	2.68	1.11
coworkers need to obtain e-records	2.64	1.21
coworkers ease of obtaining e-records	3.11	1.20
quality of e-record process	3.57	1.30

Correlating the answers to these sharing questions shows that there is a moderate relationship between needing others' records and needing to share with others ($r = .47*$). Those who need others' records find them relatively easier to obtain ($r = .42*$), and those who need to share tend to believe that others can obtain them easily ($r = .48*$).

Respondents believed that on average less than 30-40% of their electronic records were being stored by others. They also tended to believe that their present method of organizing saved electronic records was working well (mean = 3.57).

There were no differences in these results by job type. The only differences by division reflected the lower need for the Mail Delivery unit to share electronic records. There were, however, some interesting differences by type of information work performed. Table 28 shows the correlations of the scores on these records management questions with type of information work.

Table 28

	document work	admin support	data work	information retrieval
confuse e-records	.38*	.01	.07	.01
lose e-records	.11	.00	-.07	.02
need to obtain others' e-records	.36*	-.01	.23	.33*
ease of obtaining others' e-records	.32*	.31*	.24	.29
coworkers need to obtain e-records	.52*	.10	.28	.26
coworkers ease of obtaining e-records	-.02	.38*	.39*	.27
proportion of e-records saved by others	.36*	-.04	-.07	.32*
quality of e-record process	.08	.14	.14	.06

Those performing document work tended to be more likely to confuse electronic versions of records, and document workers and information retrieval workers tended to have a greater need to share records than those doing either administrative support or data work. Interestingly, there were no relationships between the kind of work done and the judgments about the overall quality of the process.

Expectations for the Pilot Project

Respondents were asked about their expectations for the pilot project on electronic records management. In general, respondents were favorable to the project. By a small margin, they felt that if shared electronic copies were accessible, it would be less important to retain personal copies (mean = 2.96, SD = 1.38); and they generally felt that the project's impact would be beneficial (mean = 3.45, SD = 1.06). There were no significant differences across job types or divisions in these conclusions. However, there were a few interesting differences by type of information work. Those performing administrative support felt it was much more important to retain personal copies of files than did those performing any of the other types of work, while those doing document work saw the impact of the shared system as much more positive than did the others (Table 29).

Table 29

	document work	admin support	data work	information retrieval
importance of retaining personal file copies	-.03	.30	.14	-.12
impact of shared file system	.46*	.10	.17	.12

Work Context Characteristics

The final part of the survey consisted of 20 questions making up five work behavior scales that have been widely used in research on information work: autonomy, variety, interdependence, change, and work group effectiveness. There were between 3 and 5 questions per scale (some were reverse-coded because of the negative wording of the questions). Although these scales have been found to be reliable in a wide variety of previous studies, in this context most of them failed to show adequate reliability (probably because of the very small sample size). Table 30 shows the reliability coefficients (Cronbach's alpha) for each of the scales.

Table 30

	alpha
Autonomy (3 items)	.49
Variety (5 items)	.69
Interdependence (3 items)	.06
Change (5 items)	.39
Work group Effectiveness (5 items)	.43

Since alphas of .60 or higher are generally required for scales to be considered truly reliable, one must be very careful in drawing any inferences from the behavior of these scales.

Table 31 shows the scales broken down by job type.

Table 31

		Autonomy	Variety	Interde-pendence	Change	Work Group Effective-ness
analyst	Mean	4.03	4.35	4.18	3.85	4.23
	Std. Deviation	0.66	0.34	0.54	0.50	0.63
management	Mean	4.17	4.15	4.15	3.86	4.41
	Std. Deviation	0.81	0.49	0.59	0.52	0.56
other	Mean	3.80	3.72	3.80	3.20	3.78

	Std. Deviation	0.91	0.87	0.67	0.52	0.56
Total	Mean	4.06	4.10	4.08	3.71	4.23
	Std. Deviation	0.79	0.59	0.61	0.58	0.62

There are significant differences between the job types in variety, change, and work group effectiveness; in each case, the Other group is lower on the scale than either the analysts or managers, who do not differ from each other.

Table 32 shows the scale values for divisions. There are no significant differences between the divisions on any of these scales.

Table 32

		Autonomy	Variety	Interde-pendence	Change	Work group Effective-ness
Admin and Business Services	Mean	4.00	4.11	4.43	3.77	4.18
	Std. Deviation	0.77	0.86	0.71	0.39	0.66
Print Center	Mean	4.07	4.08	3.73	3.76	4.35
	Std. Deviation	0.49	0.58	0.72	0.48	0.55
Mail Delivery	Mean	4.00	3.91	4.11	3.61	4.20
	Std. Deviation	1.04	0.64	0.54	0.68	0.63
Print and Graphics	Mean	4.21	4.33	4.21	3.80	4.31
	Std. Deviation	0.82	0.49	0.43	0.68	0.75
Records and Forms Management	Mean	3.94	4.16	3.79	3.78	4.14
	Std. Deviation	0.61	0.34	0.56	0.55	0.57
Total	Mean	4.03	4.09	4.06	3.73	4.22
	Std. Deviation	0.79	0.58	0.60	0.58	0.61

However, there are a few relationships with information work that may be at least suggestive. Table 33 shows the correlations of these scales with the information work factors.

Table 33

	document work	admin support	data work	information retrieval
Autonomy (3 items)	.19	.00	.08	.09
Variety (5 items)	.43*	.10	.33*	.23
Interdependence (3 items)	.16	-.04	.27	.45*
Change (5 items)	.21	-.12	.23	.12
Work Group Effectiveness (5 items)	.14	.13	.07	.20

The strongest relationships are between document work and variety, and between information retrieval and interdependence. These make sense; however, as noted, any such relationships must be regarded as tentative and suggestive given the uncertainty of the scales for this sample.

DISCUSSION

Survey participants have a long average tenure (20 years) with the state and, except for those in the relatively recent Consolidated Print Center, with their present OSS Division as well. In previous research, such stability has often been associated with change resistance. On the other hand, employees have been using computers in their day-to-day work for quite some time (10 years, on average) and regard themselves as fairly knowledgeable about the applications they use. In addition, they give quite high marks to the influence of computers not only on their work effectiveness but also on the quality of their working life. These kinds of variables have been positively associated with acceptance of new information technologies. It seems likely, then, that the RMA software pilot project, if it encounters resistance, will find the resistance directed more toward changes in well established work practices than toward the new application per se.

The factor analysis of recurring information handling activities tapped by the questionnaire produced four key profiles of information work, characterized above as involving document-oriented tasks, administrative support tasks, data-oriented tasks and information retrieval tasks. Accounting for 71 percent of the total variance in reported information handling, these factors are quite robust (especially given the survey's small sample size). These information work factors are likely to have a stronger relationship to RMA software use and to experienced benefits and drawbacks from its implementation than either job type or division.

Responses to questions about how employees manage their information resources indicate that, on average, 30 to 40 percent of all sent or received email is saved, and over 50 percent of other electronic material is saved. Document-oriented work is associated with even higher rates of storage. There is considerable variation across Divisions as to whether these materials are saved in electronic form, print form, or in both media. Administration/Business Services, for instance, saves more of its records exclusively in print than any other Division, while the consolidated Print Center saves a considerable amount of its records only in electronic form. Records and Forms Management, on the other hand, is likely to save records in both media. More generally, those engaged in document-oriented work are significantly more likely than others to save records in both print and electronic form.

Most employees have no systematic approach to reviewing their saved material and purging what is no longer worth keeping (they do it whenever they happen to have the time). Interestingly, it appears that it is easier for people to find records they have saved in electronic form, especially if the records are over a year old. On the whole, however, survey participants report few difficulties with finding electronic records they have saved, being sure they are working on the desired version of a document being drafted, or locating needed shared information. They rate their present methods of organizing electronic records as working moderately well overall. However, those engaged in document-oriented work are more likely than others to experience version control problems. They also report the greatest need for sharing saved electronic information and see the future impact of an RMA-based shared file system as much more positive than others do.

As explained in the Introduction, survey items were designed not only to provide data about current information handling practices and computer experience but also to help guide RMA software implementation processes. In general, survey participants report experiencing fairly strong support from top management for information system improvements, but their perceived level of involvement as users in such information system developments is considerably lower. Perceived involvement varies notably by Division, with Records and Forms Management, the consolidated Print Center and Print and Graphics Divisions at or below the mean. Since Records and Forms Management personnel are leading the RMA software implementation effort, they have an opportunity to turn this perception around. User involvement is critical because of its strong association with implementation success in prior research.

Questions about sources of help and learning for computerized work tools revealed noteworthy differences among respondents based on job type. Analysts, for example, like to rely on online help and the vendor's help line as well as on their co-workers; everyone else strongly (and almost exclusively) favors co-workers as the first-choice source of help. Likewise, for learning to use new applications, analysts prefer self-teaching by experimentation; others prefer coaching or small or large classes. These data suggest the value of making multiple avenues to of learning and help available. They also call attention to one well-known key to implementation success: it is important to have at least one highly proficient application user ("local guru") in each work unit.

Finally, among other organizational context scales, the last section of the questionnaire included a measure of change orientation (reflecting respondents' perceptions of the extent to which the organization is able to undertake and accomplish changes in a reasonably smooth and fair way). This scale received the lowest average rating among the organizational context characteristics assessed (3.7 on a 5-point scale). As noted earlier, the reliability of these measures is low, so the rating should not be taken at face value. Nonetheless, it suggests the pilot project implementation team should give careful attention to the development of a positive change orientation among its participants.